

### **REMARKS**

This paper is responsive to the Final Office Action mailed January 14, 2008. After entry of this response, claims 1-9 are currently pending in this application and subject to examination.

Applicants thank the Examiner for withdrawing the objections to the Declaration and the Specification, as well as the rejections of claims 1 and 6 under 35 U.S.C. § 112, First and Second Paragraphs. Applicants also thank the Examiner for his professionalism and courtesy during our Telephonic Interview of February 7, 2008. During the interview, the Examiner noted that WO 01/51182 to Schwefer et al. (hereinafter, "Schwefer") does not teach addition of any reducing agents during the DeN<sub>2</sub>O stage.

Reconsideration of the application is respectfully requested in view of the following remarks.

#### **Rejection Under 35 U.S.C. § 103(a)**

Claims 1-9 stand rejected under 35 U.S.C. § 103(a) as obvious over Schwefer in view of the literature reference titled "Selective catalytic reaction of N<sub>2</sub>O with methane in the presence of excess oxygen over Fe-BEA zeolite" by Kameoka et al. (hereinafter, "Kameoka"). Specifically, the Examiner asserts that Schwefer teaches all of the process limitations of claim 1 except for the use of a hydrocarbon, carbon monoxide, hydrogen, or mixture thereof as a reducing agent for N<sub>2</sub>O. The Examiner asserts that Schwefer teaches the use of NO as the reducing agent for N<sub>2</sub>O instead. The Examiner contends that it would be obvious for persons of ordinary skill in the art to modify the Schwefer process by substituting methane for NO as the N<sub>2</sub>O reducing agent, since Kameoka discloses the reduction of N<sub>2</sub>O with methane over an iron-exchanged BEA zeolite catalyst. *See* page 3, line 5 to page 4, line 21 of the January 14, 2008 Office Action. Applicants respectfully traverse.

Schwefer discloses a process of reducing NO<sub>x</sub> and N<sub>2</sub>O from the residual gas of nitric acid production. *See* Abstract of US 2003/0143142 A1, the published U.S. national stage of Schwefer. Schwefer teaches a two-stage process: in the first stage, NO<sub>x</sub> in the exhaust gas is

reduced with ammonia; in the second stage,  $N_2O$  is catalytically decomposed over an iron-loaded zeolite. *Id.* Schwefer teaches that catalytic decomposition of  $N_2O$  is achieved with the aid of a **sub-stoichiometric** amount of  $NO_x$ , which is left over from the first stage and which acts as a **co-catalyst** to the zeolite catalyst. See ¶¶ [0022] and [0029] of US 2003/0143142 A1.

Kameoka discloses reduction of  $N_2O$  with excess methane in the presence of an excess of oxygen over Fe ion-exchanged BEA zeolite. See page 745 of Kameoka. In the Kameoka process, the methane is consumed **stoichiometrically** with  $N_2O$ . See, e.g., Table 1 of Kameoka.

Claim 1, as amended, is not obvious over the combined teachings of Schwefer and Kameoka, since NO and methane are not “known functional equivalents” as the term pertains to the process of Schwefer. Relying on *In re Fout* and MPEP § 2144.06, the Examiner asserts that claim 1 is *prima facie* obvious over the combined teachings of Schwefer and Kameoka because it would be obvious for persons of ordinary skill in the art to substitute the NO of Schwefer (“one known functional equivalent”) with the methane of Kameoka (“another known functional equivalent”). However, methane cannot be used as a “functional equivalent” of NO in the Schwefer process. As noted above, Schwefer teaches that  $NO_x$  (of which NO is a species along with  $NO_2$ ) acts as a co-catalyst to the zeolite and is thus not consumed in the reaction. In contrast, the methane in Kameoka is oxidized to form  $CO_2$  and  $H_2O$  and is thus consumed during the reduction of  $N_2O$ . As such, methane cannot be a “known functional equivalent” to  $NO_x$ , as it is used in the Schwefer process, since it would not behave as a catalyst. Furthermore, persons of ordinary skill in the art have no reasonable expectation that substituting the sub-stoichiometric amount of  $NO_x$  with a sub-stoichiometric amount of methane would be successful. As pointed out above, the methane in the Kameoka process is consumed stoichiometrically with  $N_2O$ . If the sub-stoichiometric amount of  $NO_x$  in Schwefer was replaced by a sub-stoichiometric amount of methane, there would be insufficient methane present for reduction of the  $N_2O$ . As such, there is no reasonable expectation that such a substitution would succeed, which is required to establish claim 1 as *prima facie* obvious.

In addition, claim 1 is non-obvious because Schwefer neither teaches nor suggests addition of a reagent to reduce  $N_2O$ . Schwefer teaches a two-step process: a “De $NO_x$  stage”

followed by a "DeN<sub>2</sub>O stage." See e.g., ¶¶ [0038] to [0050] of US 2003/0143142 A1. During the DeN<sub>2</sub>O stage, N<sub>2</sub>O is catalytically decomposed (to N<sub>2</sub> and O<sub>2</sub>) over an iron-loaded zeolite with a substoichiometric amount of NO<sub>x</sub> present as co-catalyst. In the DeNO<sub>x</sub> stage, a reducing agent, such as NH<sub>3</sub>, is added to reduce the NO<sub>x</sub>, whereas, as noted by the Examiner, no reducing agents are added in the DeN<sub>2</sub>O stage to reduce the N<sub>2</sub>O. In contrast, the presently claimed process comprises the addition of two distinct reducing agents: (1) at least one nitrogen-containing reducing agent to completely reduce the NO<sub>x</sub>, and (2) a hydrocarbon, carbon monoxide, hydrogen, or a mixture of one or more of these gases to reduce the N<sub>2</sub>O.

Since (1) NO and methane are not "known functional equivalents," (2) there is no reasonable expectation that substituting NO with methane would be successful, and (3) Schwefer neither teaches nor suggests addition of reducing agent to reduce N<sub>2</sub>O, *prima facie* obviousness of claim 1 has not been established. Furthermore, since claims 2-9 all depend directly or indirectly from claim 1, *prima facie* obviousness of these claims is not established. Therefore, Applicants respectfully request that the above rejection be withdrawn.

In view of the foregoing remarks, Applicants believe the pending application is in condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 09600-00023-US from which the undersigned is authorized to draw.

Dated: February 14, 2008

Respectfully submitted,

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